

## Hedonic Quality of Empek-Empek with the Addition of Kappa Carrageenan

A.D. Murtado

Food Science and Technology, University of Muhammadiyah Palembang.  
Jalan Jend A. Yani, 13 Ulu Palembang, Indonesia Tel: +62- 711 -511731  
[murtado.asyari@yahoo.com](mailto:murtado.asyari@yahoo.com)

Ade Verayani

Food Science and Technology, University of Muhammadiyah Palembang.  
Jalan Jend A. Yani, 13 Ulu Palembang, Indonesia Tel: +62- 711 -511731  
[adeverayani@yahoo.co.id](mailto:adeverayani@yahoo.co.id)

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### ABSTRACT

Empek-empek is the traditional food of Palembang which is made of the mixture of minced fish and flour and then it is shaped into certain shape. Snakehead Murrel fish (Ikan Gabus) is a kind of fish which produce tasteful empek-empek (crispiness, aroma, colour and taste) and it was loved by the consumer. The high price of Snakehead Murrel fish made the producer of empek-empek turned to use Dorab wolf-herring (Ikan Parang-parang). Empek-empek from Dorab wolf-herring fish was not really liked by the consumer. Various efforts was conducted to produce this empek-empek with the addition of various materials, even with the material which is banned by the government, such as borax. The result of research which was conducted to sausage and meatball showed that the addition of kappa carrageenan was able to fix the crispiness and colour, and even lengthen the duration of storage.

The purpose of this study was to analyze the level of likeness, hedonic quality and the storage duration of empek-empek which was made of Dorab wolf-herring fish with the treatment of variation in kappacarrageenan concentration. One kilogram of minced Dorab wolf-herring fish was mixed with one kilogram of flour. It was mixed well until it was homogen and then it was added with water and salt while it was kept being stirred until the dough was easy to be shaped. While it was stirred, we added kappacarrageenan with the concentration of 0%, 0.35%, 0.4%, 0.45%, 0.5%, 0.55%. Then, it was boiled. When it was already cool down, it was fried and served for the testing. The Parameter which was observed were: level of liking, crispiness, aroma, colour and storage duration. The testing was done by 36 panelists with the paired comparison testing method. The one which was compared to it was the empek-empek which was sold in the commercial market. The result of the testing showed that the addition of kappacarrageenan was able to fix the level of liking, crispiness, aroma, colour and storage duration of Dorab wolf-herring fish empek-empek. Empek-empek with the addition of kappacarrageenan 0.45% has the best hedonic quality, it was better than other treatments. The addition of 0.45% kappacarrageenan is the one which was loved the most by the panelists.

**Keywords:** hedonic quality, Empek-empek, Kappa carrageenan

### INTRODUCTION

Empek-empek is the traditional food of Palembang which is made of the mixture of minced fish and flour and then it is shaped into certain shape. It was served with a special sauce which is called "cuko empek-empek". There are many variations of empek-empek and also there are many variations of dishes which use empek-empek as the basic material, so it can be suited based on our appetites. There are Empek-empek kapal selem, empek-empek lenjer, empek-empek adaan, empek-empek keriting, empek-empek panggang, and there are also the derivations of empek-empek such as climpungan, empek-empek lenggang, model and tekwan.

The scarcity of Snakehead Murrel fish (ikan Gabus) and Clown-knife fish (ikan Belida) makes the price of those fish higher. Narrow-barred Spanish Mackarel (ikan Tenggiri) which becomes the main alternative ingredient of empek-empek is also rising in price. The second alternative ingredient of making empek-empek is Dorab Wolf-herring fish (ikan Parang-parang). This fish has cheaper price than the price of three fish above. The disadvantage of Dorab Wolf-herring fish is that the empek-empek from this fish produce the least characteristics of taste than empek-empek from Snakehead Murrel fish, Clown-knife fish, and Narrow-barred Spanish Mackarel. That is the reason why an effort should be done so that the empek-empek from this fish can have the same quality of taste with empek-empek from Snakehead Murrel fish, Clown-knife fish and Narrow-barred Spanish Mackarel.

Kappacarrageenan had been succeeded in fixing the tasteful quality of meatball and lengthen its duration of storage. Besides, it also enriched the nutritional value of the meatball. Based on the study of Hudaya (2008), it was concluded that the addition of Kappacarrageenan powder to tofu product in the amount of 0.25% and 0.5% could fix its gel-like characteristic.

## MATERIALS AND METHOD

The materials which was used were the flesh of Dorab Wolf-herring fish, flour, kappacarrageenan, water and salt. The tools were knife, fish mincer, spon, pan, frying pan and stove. The clean Dorab Wolf-herring fish was minced with the fish mincer. To reach the maximum soft texture, the fish was minced twice. 1 kilogram of minced fish was mixed with 1 kilogram of flour and added with water. We mixed it well. Then, we added Kappacarrageenan with the treatment variations of 0.35%, 0.4%, 0.45%, 0.5%, and 0.55% while it was stirred. After that it was shaped into long cylindrical shape with the length and diameter of 5cm X 2cm and boiled. The boiling process was done until the empek-empek float and get bigger than the original size.

Next, when it was already cool down, it was fried and served for the tasting test. The tasting test was done to find out the panelists' level of liking and the hedonic quality of crispiness, aroma and colour with method of Soekarto (1985), analysis of crude fiber (AOAC, 1995); amount of water (AOAC, 1995) and colour brightness used tool is colour reader type CR-10, 360g/12.7oz

### Tasting Test

The test was conducted by 36 semi-trained panelists which were the students of Food Science and Technology study program. Before the test was conducted, the panelist were given the instruction about the scoring system. The scoring was conducted with this rate:

Level of liking	Score
• Really like	1
• Like	2
• A bit like	3
• A bit dislike	4
• Dislike	5
• Hate	6
• Really hate	7

Each panelist was asked to give response based on their liking to the empek-empek which was served by tasting it well and carefully.

### Hedonic Quality of Crispiness

The Panelists was asked the response of the crispiness of empek-empek which was served by biting and chewing. Then, they compared the crispiness with another empek-empek which was bought from the market. After that they gave the score based on this rate:

Crispiness Specification	Score
• Crispier	5
• A bit crispier	4
• Somewhat the same	3
• A bit uncrispy	2
• More uncrispy	1

### The Hedonic Quality of Aroma

The hedonic quality of aroma was scored by smelling the empek-empek which was served and then it was compared with another empek-empek from the market. They gave the response based on this rate:

Aroma Specification	Score
• Fresher	5
• A bit fresher	4
• Somewhat the same	3
• A bit unfresh	2
• Unfresh	1

### The Hedonic Quality of Colour

The testing of hedonic quality of colour was conducted by looking at it carefully and then comparing it with the colour of empek-empek which was bought from the market. The panelists gave the score based on this rate:

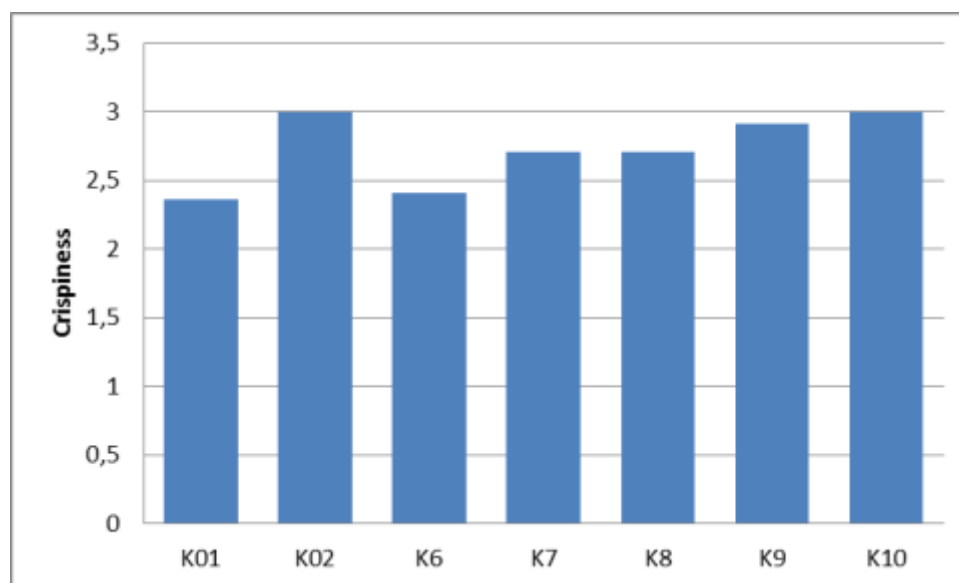
Colour Specification	Score
• Whiter	5
• A bit whiter	4
• Somewhat the same	3
• A bit dull	2
• Duller	1

## RESULTS AND DISCUSSION

### Hedonic Quality of Liking

The result of variation analyses showed that the variation of Kappacarrageenan addition to empek-empek from Dorab Wolf-herring fish had significant influence to the panelists level of liking. From the five treatments which was tested, it was proven that the addition of 0.45% Kappacarrageenan to empek-empek from Dorab Wolf-herring was the one which was liked the most than other treatments. The addition of 0.45% Kappacarrageenan to empek-empek gave the result as the one which was liked the most by the panelists.

### Hedonic Quality of Crispiness

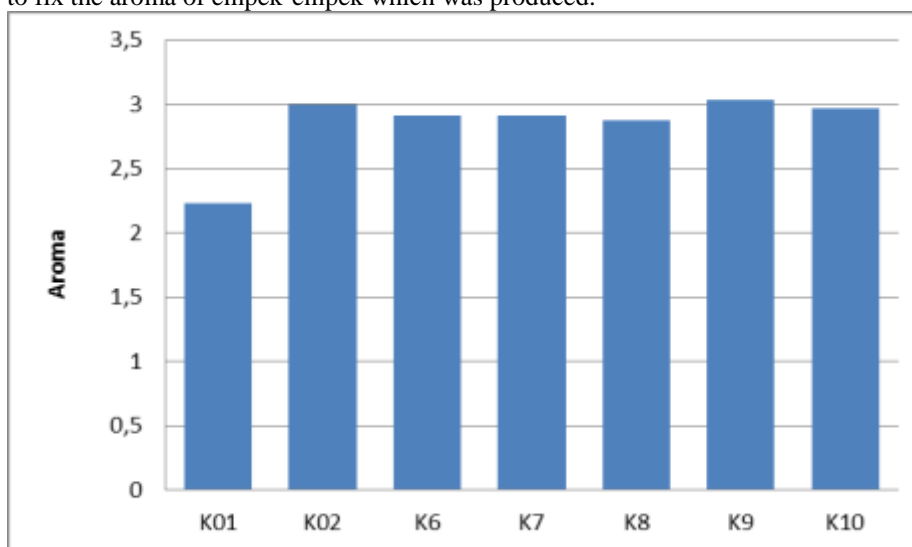


Picture 1. Crispiness of empek-empek with carrageenan (K6-K10) compared to empek-empek without carrageenan (K01) and commercial empek-empek (K02)

The result of paired comparison test between empek-empek with carrageenan, commercial empek-empek and empek-empek without carrageenan on picture 1, showed that the addition of carrageenan 0.35% had crispiness level below the commercial empek-empek, which was a bit more uncrispy, one level below the crispiness of commercial empek-empek. The increase of the next kappa carrageenan addition (0.4%, 0.45%, 0.5% and 0.55%) gave influence to the crispiness which also increased to almost the same crispiness of commercial empek-empek, which was somewhat the same or not really different with commercial empek-empek. Genu (2002) type of gel kappa is strong and brittle. These properties that result in carrageenan are able to make empek-empek is chrisp.

### Hedonic Quality of Aroma

The result of analyses of the empek-empek's aroma variation with the addition of Kappacarrageenan 0.35%, 0.4%, 0.45%, 0.5%, dan 0.55% was it had no difference with the aroma of commercial empek-empek and it had significant difference with empek-empek without Kappacarrageenan. Kappacarrageenan was proven to be able to fix the aroma of empek-empek which was produced.

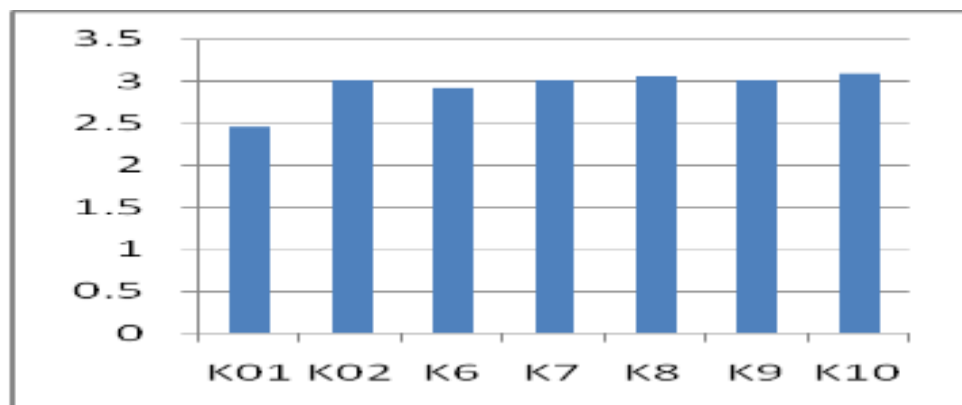


Picture 2. Aroma of Kappacarrageenan empek-empek (K6 – K10) compared to empek-empek without Kappacarrageenan (K01) and commercial empek-empek (K02).

In Picture 2, the score of aroma of empek-empek without Kappacarrageenan (K01) was 'A bit unfresh' compared to the aroma of commercial empek-empek (2.23: 3). Empek-empek with the addition of Kappacarrageenan had the aroma which was not so much different with the commercial empek-empek (2.91, 2.91, 2.88, 3.03, 2.97:3).

### Hedonic Quality of Colour

The result of variation analyses showed that the colour of empek-empek from Dorab Wolf-herring fish with the addition of Kappacarrageenan was not really different with the commercial empek-empek and it had significant difference with empek-empek without Kappacarrageenan. From the average score of colour quality (picture 3), it can be seen that Kappacarrageenan could fix the colour of empek-empek from Dorab Wolf-herring fish.



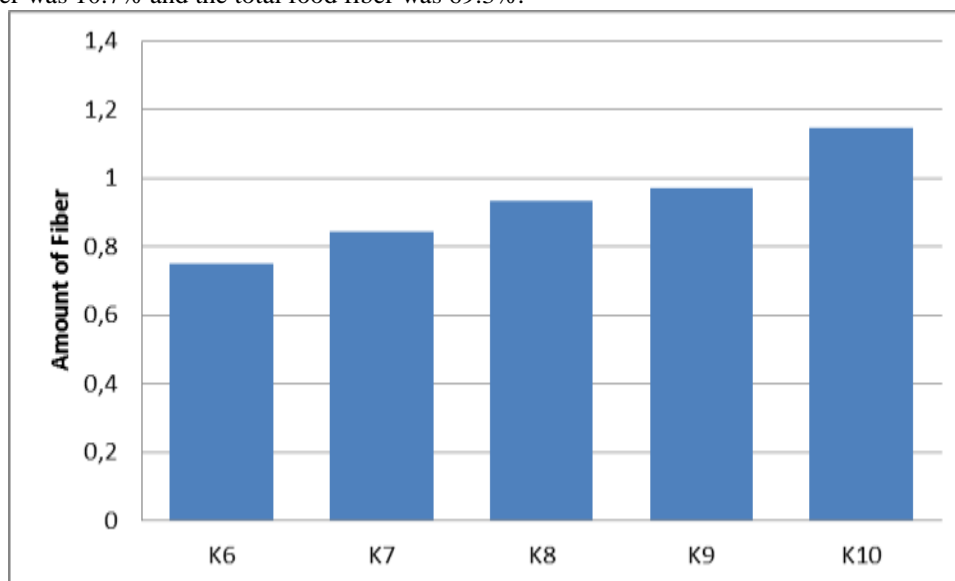
Picture 3. Colour of empek-empek with Kappacarrageenan (K6-K10) compared to empek-empek without Kappacarrageenan (K01) and commercial empek-empek (K02)

The colour of empek-empek without Kappacarrageenan was a bit duller than the colour of commercial empek-empek (2:3). The colour of empek-empek with the addition of Kappacarrageenan was not significantly different with commercial empek-empek (2.93, 3, 3.06, 3, 3.09)

## Chemistry Analyses of Empek-Empek with Carrageenan

### 1. Amount of Fiber

In this study the fiber which was measured was the rough fiber which was defined as food material which cannot be hydrolyzed by the certain chemicals such as sulphuric acid ( $H_2SO_4$  1,25N) and natrium hidroxyde (NaOH 3.25%). The result of variation analyses showed that the amount of food fiber in empek-empek was influenced significantly by the amount of kappa carrageenan which was added. There was linear and positive correlation between the amount of kappa carrageenan which was added and the amount of fiber in empek-empek. The higher kappa carrageenan which was added in the process of making it the higher also the fiber in it. The result of the study of Santoso et al (2003) reported that the amount of dissolved food fiber was 58.6%, undissolved food fiber was 10.7% and the total food fiber was 69.3%.

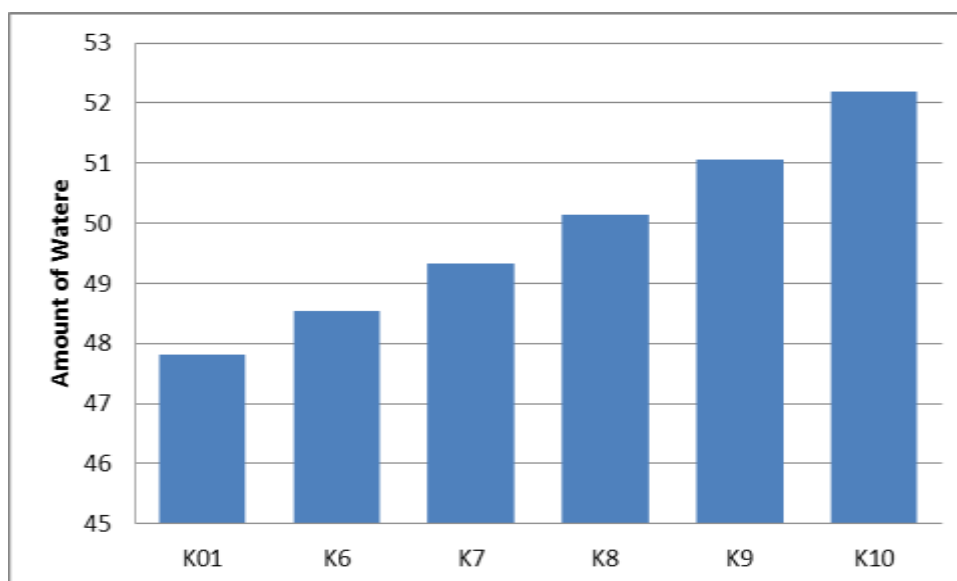


Picture 4. Average amount of rough fiber of empek-empek from Dorab wolf-herring fish because of the addition of varied kappa carrageenan

The result of significant different real test showed that there was influence of significant difference between the treatment in the level of trust for 5%. The treatment of K6 was significantly different with the treatment of K7, K8, K9 and K10. The treatment of K7 was significantly different with the treatment of K8, K9 and K10. The treatment of K8 was significantly different with the treatment of K9 and K10. The treatment of K9 was significantly different with the treatment of K10. Consecutively, the amount of fiber for each treatments were 0,465%, 0749%, 0844%, 0933%, 0,969% and 1,148%.

### 2. Amount of Water

The amount of water in empek-empek from Dorab wolf-herring fish was significantly influenced by the variation of kappa carrageenan addition. The higher concentration of kappa carrageenan which was added, the higher the amount of water in it. The result of significantly different test honestly showed that K6 was insignificantly different with K7 but significantly different with K8, K9 and K10. K7 was insignificantly different with K8 but significantly different with K9 and K10. K8 was insignificantly different with K9 but significantly different with K10. K9 was significantly different with K10. Consecutively, the amount of water in each treatments were 47.812%, 48,534%, 49,331%, 50,149%, 51,061% and 52,197%.

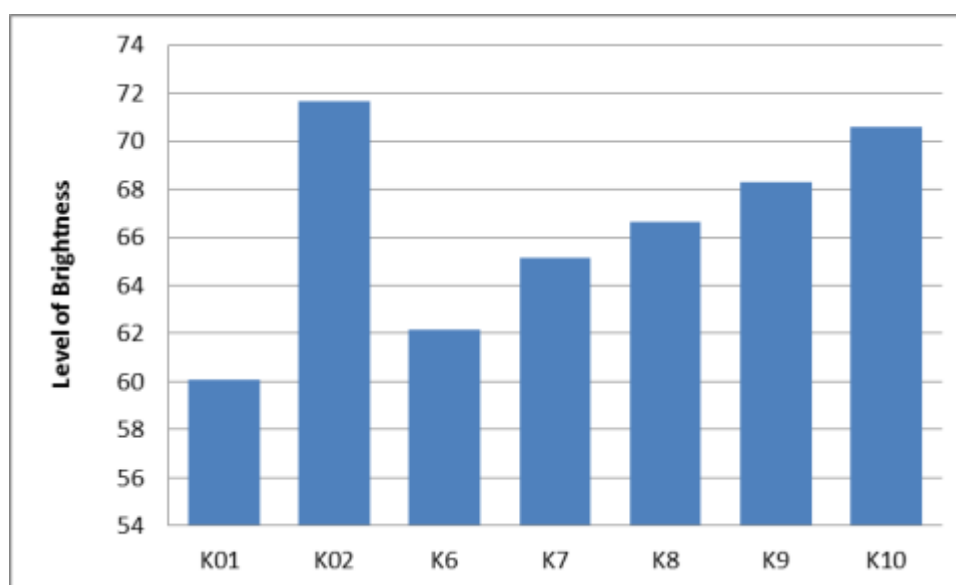


Picture 5. Amount of water in empek-empek from Dorab wolf-herring fish because of the addition of varied kappa carrageenan.

Molecule of fiber has the form of big size polymer, complex structure, and has many hydrophil group and has big capacity of water bonding. The physical and chemical characteristics of each component of fiber were important determining the physiologic and chemical reaction which was produced from the source of fiber in the food (Prosky and De Vries, 1992 *in* Tress 2003). The ability of food fiber in bonding water will affect the ability of food in sustaining its moisture so the product will not be broken easily because of the dryness and the texture will stay good. This characteristic is really important in empek-empek. If we store it in low temperature and in open room, empek-empek will get some physical crack and it will get drier and harder.

### 3. The Level of Colour Brightness

The measurement of colour brightness used colour reader series CR-10 with the size and wide of the ray 360g/12.7 oz. The principal of its work is with the colour appliance system using CIE system with three colour receptor L, a, b hunter. Icon L shows the level of brightness based on white colour, icon a shows the colour of greenish or reddish and icon b shows the colour of yellowish or bluish.



Gambar 6. Level of brightness of empek-emepek from Dorab wolf-herring fish because of the addition of varied kappacarrageenan

The result of analyses showed that the level of colour brightness was influenced significantly by the concentration of kappa carrageenan which was added to empek-empek from Dorab wolf-herring fish. Then, with the significant different real test it was proven that K6 was significantly different with K7, K8, K9 and K10. K7 was insignificantly different with K8 but significantly different with K9 and K10. K8 was insignificantly different with K9 and K10. K9 was insignificantly different with K10. On picture 6 we can see that the higher kappa carrageenan addition to empek-empek from Dorab wolf-herring fish the brighter the colour of empek-empek which was produced. But the brightness of it is not as bright as the borax addition which reaches the value of 71.67. Consecutively the brightness level of each treatments were 60.07; 71.67; 62.15; 65.17; 66.65; 68.32; 70.60

#### 4. Shelf Life

Kappa carrageenan addition of significance on the shelf life empek-empek in cold storage and frozen. After being stored for 4 months in freezing temperatures, surface of empek-empek no physical damage, no crack remains intact. Different with empek-empek without carrageenan, it's surface cracked and dry and become very hard. The fiber content on empek-empek able to retain moisture during storage. Kuah (2010) report that eucheuma denticulatum solution could retain the moisture and reserve the texture of fish ball

### CONCLUSIONS AND SUGGESTIONS

From the result of this research, it can be concluded that:

1. Addition of kappa carrageenan can improve the quality of hedonic empek-empek, rich in fiber and extend the shelf life
2. The addition of kappa carrageenan significantly gives positive influence to the hedonic quality of colour, aroma and crispiness. It wasn't different from the colour, aroma and crispiness of commercial empek-empek.
3. Kappa carrageenan in empek-empek can sustain its moisture so empek-empek will not be dry and crack easily when we store it in low temperature. It happens because kappa carrageenan contains fiber.
4. The amount of fiber in empek-empek with kappa carrageenan addition of 0.35%, 0.40%, 0.45%, 0.50% and 0.55% were 0.749%, 0.844%, 0.933%, 0.969% and 1.148% with the amount of water of 48.534%, 49.331%, 50.149%, 51.061% and 52.197%.
5. The duration of storage in a room temperature can last until 2 days while in low temperature (5°C – 8°C) it can last until 4 to 6 days. At the temperature of 0°C it can last until more than 4 months.
6. After 4 months of frozen storage, the surface remains intact no cracks empek-empek

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